SPACEBASED OBSERVATIONS OF THE OCEANIC RESPONSES TO MONSOONS IN SOUTH CHINA SEA AND ARABIAN SEA

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A large percentage of the world's population and their agrarian economy must endure the vagaries of the monsoons over the tropical oceans between Africa and the Philippines. We know very little about the oceanic responses to changes of the monsoon in the South China Sea (SCS), which is under the influence of the East Asian Monsoon System, and the Arabian Sea (AS), which is dominated by the Indian Monsoon System; oceanic observations are sparse in both regions. Data from spaceborne microwave scatterometers and radiometers have been used to estimate the two major atmospheric forcing, momentum flux and latent heat flux (LHF), which change with the monsoon winds. Spaceborne sensors also observed the surface signatures of the oceanic response: SST and sea level changes (SLC). Sufficient durations of these data have recently become available to allow the meaningful studies of the annual cycles and interannual anomalies.

In SCS, the winter monsoon is strong and steady but the summer monsoon is weak and has large intraseasonal fluctuations. In AS, the summer monsoon is much stronger than the winter monsoon. Significant correlations between LHF and SST tendency, and between curl of wind stress and SLC are found in both oceans. In the north SCS, winds are strong and dry, LHF is high, and ocean cooling is also large in fall; LHF is low and the ocean warms up in spring. In AS, LHF and SST tendency have a semi annual period; LHF is high in summer when the wind is strong and in winter when the wind is dry. Along the coast of Oman, the strong summer southwest monsoon causes intense upwelling, low SST and LHF in summer; such wind-driven SST changes is not as obvious along the Vietnam coast because of the weaker summer monsoon. The negative correlation between curl of wind stress and SLC found in the central basins of both SCS and AS agrees with a simple Ekman pumping scenario. Cyclonic winds drive surface divergence and upwelling in the ocean; the rise of the thermocline causes lower sea levels. Anticyclonic winds cause higher SLC. The exceptions (positive correlations) are found in the coastal regions in the north and the south of SCS, off the west coast of India between 5°N and 10°N, and along the coast of Somalia.